Amendments to the Specification

Please replace the paragraph that begins on page 2, line 11, with the following amended paragraph:

Thermal decay is related to the ratio of the energy barrier that must be crossed in order to switch the magnetization of the magnetic material of a magnetic disk to ~~disk to~~ the thermal energy of the surrounding environment. In general, as the energy in the environment becomes more nearly equal to this energy barrier, thermal decay is more likely to occur. A magnetic disk having only a thin layer of magnetic material is particularly susceptible to thermal decay because the energy required to switch the magnetization of a portion of that disk is low. In addition, when data is stored at high densities, the area of the disk used to store a bit of information as a particular magnetic polarity (*i.e.* a bit cell) is small. Therefore, the energy required to switch the magnetization of a bit cell is reduced with increased areal densities. Furthermore, as grain sizes have been reduced, the anisotropic energy associated with each grain has also been reduced. As the anisotropic energy of each grain becomes nearer to the ambient thermal energy in a disk drive, information stored on the magnetic disk is more likely to be lost due to thermal decay.

Please replace the paragraph that begins on page 3, line 16, with the following amended paragraph:

In order to address the effects of thermal decay, various measures have been taken. For example, error correction code may be used to restore data lost through processes such as thermal decay. However, the ability of error correction code to restore

lost data is limited. In ~~limited. In~~ addition, the use of error correction code results in decreased user data density.

Please replace the paragraph that begins on page 3, line 21, with the following amended paragraph:

Attempts have also been made to produce magnetic disks having grains with large anisotropic energies. However, increasing the anisotropic energy of the grains generally requires larger grain sizes. As mentioned above, a larger grain size increases the noise of a signal produced by data stored on the magnetic disk. In particular, the transition noise is increased. Increased noise reduces the signal to noise ratio, and may adversely affect the bit error rate of the disk drive. In addition, if the anisotropic energy is increased by increasing the anisotropic constant (Ku), the coercivity ~~coersivity~~ (Hc) is also increased, and it becomes more difficult to write transitions to the magnetic disk.

Please replace the paragraph that begins on page 8, line 12, with the following amended paragraph:

Fig. 3C illustrates an example voltage potential produced in the channel as a ~~as a~~ result of the pattern of magnetization depicted in **Fig. 3B**;

Please replace the paragraph that begins on page 8, line 21, with the following amended paragraph:

Fig. 5 ~~**Fig.5**~~ is a functional flow diagram illustrating the operation of a system in accordance with an embodiment of the present invention; and

Please replace the paragraph that begins on page 9, line 11, with the following amended paragraph:

Actuator arm assemblies **116** (only one of which is shown in **Fig. 1**) are interconnected to the base **104** by a bearing **120**. Actuator arm assemblies **116** each include a transducer head **124** at a first end, to address each of the surfaces of the magnetic disks **108**. The transducer heads **124** typically include read and write elements (not shown). A voice coil motor **128** pivots the actuator arm assemblies **116** about the bearing **120** to radially position the transducer heads **124** with respect to the magnetic disks **108**. By changing the radial position of the transducer heads **124** with respect to the magnetic disks **108**, the transducer heads **124** can access different tracks or cylinders **132** on the magnetic disks **108**. The voice coil motor **128** is operated by a controller **136** that is in turn operatively connected to a host computer (not shown). A channel **140** processes information read from the magnetic disk **108** by the transducer heads **124**.

Please replace the paragraph that begins on page 10, line 1, with the following amended paragraph:

With reference now to **Fig. 2**, a typical arrangement of data tracks **132** on a magnetic disk **108** is illustrated. Usually, the data tracks **132** are divided into data sectors ~~fields~~ **204a-h** with a servo sector **208a-h** between one or more of the data sectors ~~fields~~ **204a-h**. Generally, the data sectors **204a-h** ~~fields **208a-h**~~ are used for storing data, while the servo sectors **208a-h** are used for storing servo information that is used to provide the transducer head **124** with positioning information. Typically, at least some of the information contained in the servo sectors **208a-h** is written during the servo track

writing process, and the portions of the servo sectors **208a-h** containing such information generally cannot be written to after the disk drive **100** is assembled. In particular, the servo sectors **208a-h** provide the transducer heads **124** with information concerning their position over the magnetic disks **108**, including servo sector position bursts and embedded runout correction (ERC) ~~information~~ fields, and information used to calibrate the channel **140**, including automatic gain control ~~information~~ (AGC) fields. Data and other information can be stored in tracks **132** according to either longitudinal or perpendicular recording schemes.

Please replace the paragraph that begins on page 10, line 15, with the following amended paragraph:

The tracks **132** on the magnetic disk **108** may further be divided into a plurality of zones **212a-c**. The grouping of tracks **132** into a plurality of zones **212** facilitates the efficient storage of data on the disk **108**. For example, because the disk **108** rotates at a constant speed, user data may be stored in tracks **132** associated with a zone (*e.g.,* zone **212a**) located towards an outside diameter of the disk **108** at a relatively high frequency, while maintaining adequate disk area to reliably store the data as magnetic transitions. In contrast, user data generally cannot be written to a track **132** within a zone (*e.g.,* zone **212c**) located towards an inner diameter of the disk **108** at the same high frequency as user data for storage in a track in a zone at an outer diameter, such as zone **212a**. This is because at the inside diameter, insufficient disk area would be then used in connection with the magnetic transitions used to store user data reliably.

Please replace the paragraph that begins on page 11, line 5, with the following amended paragraph:

Although the magnetic disk **108** illustrated in **Figs. 1** and **2** is shown as having a relatively small number of data tracks **132**, data sectors ~~fields~~ **204**, servo sectors **208** and zones **212**, it can be appreciated that a typical computer disk drive **100** contains a very large number of data tracks **132**, data sectors ~~fields~~ **204**, and servo or hard sectors **208**, and may have a greater or lesser number of zones **212**. For example, computer disk drives **100** having over 30,000 tracks per inch and 120 servo sectors are presently available.

Please replace the paragraph that begins on page 13, line 12, with the following amended paragraph:

Fig. 4B ~~**Fig 4B**~~ depicts a pattern of magnetic polarities corresponding to the pattern of magnetization illustrated in **Fig. 4A**. As will be appreciated from a comparison of the relevant figures, the magnets **404** in the perpendicular recording scheme illustrated in **Fig. 4B** are rotated 90° with respect to the magnets **304** of **Fig. 3B**.

Please replace the paragraph that begins on page 15, line 17, with the following amended paragraph:

With respect to a longitudinal recording scheme, the test pattern is preferably ~~is preferably~~ more susceptible to thermal decay than a 1T pattern written as normal user data. For example, the test pattern may be written at a frequency that is higher than the frequency used to write user data to the same or a similar track **132**, and thus at a

relatively high data density. The test pattern may be written at a higher frequency than that used for normal user data by writing the test pattern to a track **132** included in a zone **212** (*e.g.*, zone **212c** of **Fig. 2**) located towards an inner diameter of the disk **108** but using a data frequency that would normally be used to write user data to a track **132** associated with a zone **212** (*e.g.*, zone **212a** of **Fig. 2**) located towards an outer diameter of the disk **108**. As noted above, in a longitudinal recording scheme such a pattern will tend to be more susceptible to the effects of thermal decay than user data, because the magnetic transitions are then written to a shorter length of track **132** than is user data, and therefore are contained in a relatively small volume of magnetic material.

Please replace the paragraph that begins on page 19, line 8, with the following amended paragraph:

With reference now to **Fig. 6**, a functional flow diagram in connection with another embodiment of the present invention is illustrated. Initially, at step **600**, the amplitudes of automatic gain control (AGC) fields are measured in order to obtain the amplitudes of signals derived from those fields. At step **604**, a test pattern is written to a sector of track **132** associated with an AGC field having a low amplitude. In general, a sector associated with an AGC field having a relatively low amplitude will be more susceptible to thermal decay, as described above. For example, a low AGC field amplitude may indicate an area of the disk **108** in which the layer of magnetic material is particularly thin. In accordance with an embodiment of the present invention, an AGC field amplitude may be considered low if it is at least about 10% less than an average AGC field amplitude. In accordance with another embodiment of the present invention,

the AGC field amplitude may be considered low if it is ~~less than~~ about 5% less than an average AGC field amplitude. At step **608**, the amplitude of a signal produced by reading the test pattern is measured. The measured amplitude is then stored (step **612**). In general, steps 600-612 may be performed prior to delivery of the disk drive **100** to the end user.

Please replace the paragraph that begins on page 20, line 3, with the following amended paragraph:

Next, a determination is made as to whether testing for indications of thermal decay should be performed (step **616**). As with the previous embodiment described in connection with **<u>Fig. 5,</u>** ~~**Fig. 4,**~~ testing may be indicated after a predetermined period of time has elapsed, or after an instruction to test for thermal decay has been received from the user. If it has been determined that testing for thermal decay should proceed, the test pattern is read to obtain an observed amplitude of a signal produced by the test pattern in the channel **140** (step **620**). The stored amplitude is then compared to the observed amplitude. If the stored amplitude is greater than the observed amplitude plus a marginal amount (step **624**), a thermal decay warning signal is generated (step **628**). If the stored amplitude is not greater than the observed amplitude plus a marginal amount, the drive returns to step **616** to await the next instruction to perform testing in connection with the detection of thermal decay.

Please replace the paragraph that begins on page 21, line 5, with the following amended paragraph:

In accordance with another embodiment of the present invention, a test pattern can be used in connection with a disk drive's **100** internal diagnostic procedures to provide an early warning of thermal decay. For example, the voltage gain amplitude (VGA) register value obtained when the transducer head **124** ~~126~~ is reading the test pattern can be stored. When testing of the disk drive **100** is desired, the test pattern is again read and the VGA value obtained ~~read~~ is compared to the stored VGA value. If the observed VGA value is 10% less than the stored VGA value, a thermal decay warning signal may be generated.